

A journey through the use of mathematical models to gain insight into sociological phenomena

Nancy Rodriguez

University of Colorado - Boulder

While mathematical models have traditionally played a central role in physics and engineering, they have increasingly become valuable tools in disciplines such as biology, ecology, and sociology. In this talk, I will explore how partial differential equations and dynamical systems can be used to gain insight into various social phenomena. The first part of the talk will focus on modeling protest activity, approached from a multi-scale perspective. In the second part, I will discuss the use of kinetic equations as a framework for understanding systemic social issues. I will introduce a new numerical method designed to efficiently solve large systems of kinetic equations with transition potentials relevant to social applications. This method will then be applied to a case study on the spread of violent acts. Finally, I will highlight the advantages of employing mathematical modeling in situations where empirical data is limited or unavailable.

In Special Invited Talks at the Mathematical Congress of the Americas 2025.